Amendments to the Claims:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strikethrough~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

1. (currently amended) A wavelength division multiplexing optical transmission system, comprising:

a plurality of optical senders outputting signal lights with different wavelengths and filtered by a plurality of respective filters, and said filters are configured to yield filtered signal lights having respective bit rates and frequency spacing to approach a spectrum efficiency ~~maximizing~~at which a product of a transmission distance and a transmission capacity of the system is maximized;

an optical multiplexer multiplexing the filtered signal lights to be transmitted to an optical transmission path as a wavelength division multiplexing signal light; and

an optical demultiplexer demultiplexing the wavelength division multiplexing signal light having different respective wavelengths to be received by a plurality of optical receivers,

wherein the type of modulation of said signal light is an NRZ modulation type, and

wherein an equation model expressing transmission characteristics of said optical multiplexer and said optical demultiplexer is expressed by the following equation in which each transmission band T(f) corresponding to each signal light is expressed by using a frequency f, where fc is a center frequency of the transmission band, and Δf is a full width at half maximum of the transmission band, as a filter order "n"

$$T(f)=10\cdot\log\left[\exp\left\{-2\cdot\ln\sqrt{2}\cdot\left(\frac{|f-fc|}{\Delta f/2}\right)^{2n}\right\}\right]\quad(\text{dB})$$

wherein the spectrum efficiency at which the product of said transmission distance and said transmission capacity becomes the maximum value is calculated as spectrum efficiency at which a performance index PI=10 · (-ΔQ/10) · B/S, which is expressed using a Q-value degradation amount ΔQ of the system, a bit rate B and frequency spacing S of the signal light, becomes a maximum value.

2. (cancelled).

3. (previously presented) A wavelength division multiplexing optical transmission system according to claim 1,

wherein said filter order "n" is secondary, and the spectrum efficiency at which the product of said transmission distance and said transmission capacity becomes the maximum value is 0.574bit/s/Hz.

4. (original) A wavelength division multiplexing optical transmission system according to claim 3,

wherein, when the bit rate B and frequency grid I per one wave of the signal light are given in advance, a natural number "k" is selected so as to minimize a difference between the spectrum efficiency B/(kI) where "k" is the natural number, and the spectrum efficiency at which the product of said transmission distance and said transmission capacity becomes the maximum value, so that frequency spacing S=kI, of the signal light is set in accordance with the natural number "k".

5. (original) A wavelength division multiplexing optical transmission system according to claim 4,

wherein, when a value B/I obtained by dividing said bit rate B by said frequency grid I is 1.6 to 2.0bit/s/Hz, 3 is selected as said natural number "k".

6. (original) A wavelength division multiplexing optical transmission system according to claim 5,

wherein, when 40 to 50Gbit/s is given as said bit rate B, and 25GHz interval is given as said frequency grid I, frequency spacing is set to 75GHz.

7. (original) A wavelength division multiplexing optical transmission system according to claim 4,

wherein, when a value B/I obtained by dividing said bit rate B by said frequency grid I is 1.6bit/s/Hz, and 3 is selected as said natural number "k",

said optical multiplexer and said optical demultiplexer have transmission characteristics following said equation model in which said filter order "n" is 1.2 or more.

8. (original) A wavelength division multiplexing optical transmission system

according to claim 7,

wherein said optical multiplexer and said optical demultiplexer have transmission characteristics in which a value $\Delta f/fb$ obtained by dividing full width at half maximum Δf of said transmission band by a clock frequency fb of the signal light, is within a range of 1.50 to 1.90.

9. (original) A wavelength division multiplexing optical transmission system according to claim 4,

wherein, when a value B/I obtained by dividing said bit rate B by said frequency grid I is 1.7bit/s/Hz, and 3 is selected as said natural number "k",

said optical multiplexer and said optical demultiplexer have transmission characteristics following said equation model in which said filter order "n" is 1.5 or more.

10. (original) A wavelength division multiplexing optical transmission system according to claim 9,

wherein said optical multiplexer and said optical demultiplexer have transmission characteristics in which a value $\Delta f/fb$ obtained by dividing full width at half maximum Δf of said transmission band by a clock frequency fb of the signal light, is within a range of 1.45 to 1.95.

11. (original) A wavelength division multiplexing optical transmission system according to claim 4,

wherein, when a value B/I obtained by dividing said bit rate B by said frequency grid I is 2.0bit/s/Hz, and 3 is selected as said natural number "k",

said optical multiplexer and said optical demultiplexer have transmission characteristics following said equation model in which said filter order "n" is 2 or more.

12. (original) A wavelength division multiplexing optical transmission system according to claim 11,

wherein said optical multiplexer and said optical demultiplexer have transmission characteristics in which a value $\Delta f/fb$ obtained by dividing full width at half maximum Δf of said transmission band by a clock frequency fb of the signal light, is within a range of 1.35 to 1.70.

13. (original) A wavelength division multiplexing optical transmission system according to claim 1,

wherein each of said optical multiplexer and said optical demultiplexer is constituted using an arrayed waveguide grating.

14. (original) A wavelength division multiplexing optical transmission system according to claim 1,

wherein each of said optical multiplexer and said optical demultiplexer is constituted by combining an optical interleaver using an interference filter, and an arrayed waveguide grating.

15. (original) A wavelength division multiplexing optical transmission system according to claim 1,

wherein each of said optical multiplexer and said optical demultiplexer is constituted by combining an optical interleaver using an interference filter, and a dielectric multi-layer film filter.

16. (cancelled)

17. (currently amended) A wavelength division multiplexing optical transmission method, comprising:

multiplexing a plurality of signal lights with different wavelengths to transmit to an optical transmission path; and

demultiplexing wavelength division multiplexed signal light propagated through said optical transmission path according to wavelength to receive,

wherein the type modulation of said signal light is an NRZ modulation type, and

wherein an equation model expressing transmission characteristics of said optical multiplexer and said optical demultiplexer is expressed by the following equation in which the shape of each transmission band T(f) corresponding to each signal light is expressed by as a function of frequency f, wherein fc is a center frequency of the transmission band, and Δf is a full width at half maximum of the transmission band, and a filter order "n",

$$T(f) = 10 \cdot \log\left[\exp\left\{-2 \cdot \ln\sqrt{2} \cdot \left(\frac{|f - fc|}{\Delta f/2}\right)^{2n}\right\}\right] \quad (\text{dB})$$

setting a bit rate and frequency spacing of the signal lights so as to approach a spectrum efficiency at which a product of a transmission distance and a transmission capacity becomes maximum, and actual transmission characteristics at the time of multiplexing and demultiplexing the signal light are set in accordance with said equation model, to transmit the wavelength division multiplexed signal light,

wherein the spectrum efficiency at which the product of said transmission distance and said transmission capacity becomes the maximum value is calculated as spectrum efficiency at

which a performance index PI=10 · (-ΔQ/10) · B/S, which is expressed using a Q-value degradation amount ΔQ of the system, a bit rate B and frequency spacing S of the signal light, becomes a maximum value.

18-25. (cancelled)

26. (currently amended) A wavelength division multiplexing optical transmission method, comprising:

multiplexing a plurality of signal lights with different wavelengths to transmit to an optical transmission path;

demultiplexing wavelength division multiplexed signal light propagated through said optical transmission path according to the received wavelength;

modulating said signal light as only an NRZ modulation type;

expressing transmission characteristics of said optical multiplexing and said optical demultiplexing by the following equation in which the shape of each transmission band T(f) corresponding to each signal light is expressed by as a function of frequency f, wherein fc is a center frequency of the transmission band, and Δf is a full width at half maximum of the transmission band, and a filter order "n",

$$T(f) \approx 10 \cdot \log\left[\exp\left\{-2 \cdot \ln\sqrt{2} \cdot \left(\frac{|f - fc|}{\Delta f/2}\right)^{2n}\right\}\right] \quad (dB)$$
;

maximizing a product of a transmission distance and a transmission capacity by setting a bit rate and frequency spacing of the signal lights;

setting actual transmission characteristics at the time of multiplexing and demultiplexing the signal light in accordance with said equation, and

transmitting the wavelength division multiplexed signal light,

wherein the spectrum efficiency at which the product of said transmission distance and said transmission capacity becomes the maximum value is calculated as spectrum efficiency at which a performance index PI=10 · (-ΔQ/10) · B/S, which is expressed using a Q-value degradation amount ΔQ of the system, a bit rate B and frequency spacing S of the signal light, becomes a maximum value.